

What is claimed is:

1. A method for forming a thin conductive lead layer of high sheet conductivity, high hardness, high melting point, high corrosion resistance and lacking the propensity for smearing, oozing, electromigration and nodule formation comprising.  
providing a laminated hard magnetic underlayer;  
forming over said underlayer an "interrupt" layer;  
forming over said "interrupt" layer a conductive lead layer, laminated so as to provide specular reflection of conduction electrons.
2. The method of claim 1 wherein the laminated hard magnetic underlayer comprises a seed double layer of Ta/Cr, the thickness of the Ta layer being preferably 50 A, but which could be in the range between 30 A and 100 A, the thickness of the Cr layer being preferably 100 A, but which could be between 50 A and 150 A, upon which Ta/Cr seed layer a layer of hard magnetic material such as CoPtCr or CoPt, is formed to a thickness between approximately 150 A and 500 A.
3. The method of claim 1 wherein the "interrupt" layer is a layer of material formed with an amorphous structure.

4. The method of claim 3 wherein the "interrupt" layer is designed to orient the crystal plane of a layer formed upon it in a direction parallel to the plane of that layer.
5. The method of claim 4 wherein the "interrupt" layer is a layer of Ta, preferably formed to a thickness of 50 Å, but which could have a thickness of between 30 Å and 75 Å.
6. The method of claim 1 wherein the conducting lead layer is a three layer lamination consisting of a first layer of NiCr, upon which is formed a layer of conducting material, upon which is formed a second layer of NiCr, the interfaces between the NiCr and the conducting material causing specular reflection of conduction electrons so as to enhance the sheet conductivity of the formation.
7. The method of claim 6 wherein the first layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 75 Å, the layer of conducting material is a layer of Rh, formed to a thickness of between 250 Å and 500 Å and the second layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 50 Å.
8. The method of claim 6 wherein the first layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 75 Å, the layer of conducting material is a layer of Ru, formed to a thickness of between 250 Å and 520 Å

and the second layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 50 Å.

9. The method of claim 6 wherein the first layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 75 Å, the layer of conducting material is a layer of Ir, formed to a thickness of between 250 Å and 510 Å and the second layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 50 Å.

10. A method for forming a thin conductive lead layer of high sheet conductivity, high hardness, high melting point, high corrosion resistance and lacking the propensity for smearing, oozing, electromigration and nodule formation comprising:

providing a laminated hard magnetic underlayer whose layer of hard magnetic material has its close packed crystal plane perpendicular to its layer plane;

forming over said underlayer a layer of conducting material whose close packed crystal layer is also in a direction parallel to the underlayer;

forming over said layer of conductive material a capping layer.

11. The method of claim 10 wherein the laminated hard magnetic underlayer comprises a seed double layer of Ta/Cr, the thickness of the Ta layer being preferably 50 Å, but which could be in the range between 30 Å and 75 Å, the thickness of the Cr layer being preferably 100 Å, but which could be between 50 Å and 150 Å, upon which Ta/Cr

seed layer a layer of hard magnetic material such as CoPtCr or CoPt, is formed to a thickness between approximately 150 Å and 500 Å.

12. The method of claim 10 wherein the layer of conductive material is a layer of Rh formed to a thickness of between 250 Å and 500 Å.

13. The method of claim 10 wherein the layer of conductive material is a layer of Ir formed to a thickness of between 250 Å and 515 Å.

14. The method of claim 10 wherein the capping layer is a layer of Cr, preferably formed to a thickness of 30 Å, but which could be between 20 Å and 50 Å.

15. A spin valve type magnetoresistive read element for reading high recorded density, high RPM magnetic disks, comprising a spin valve sensor element with abutted junctions upon which is formed a laminated longitudinal bias layer of hard magnetic material having high coercivity and squareness, and upon which is formed a laminated conducting lead layer of high sheet conductivity, high hardness, high melting point, high corrosion resistance and lacking the propensity for smearing, oozing, electromigration and nodule formation comprising:

a substrate;

a spin valve type sensor element;

a laminated hard magnetic underlayer comprising a Ta/Cr seed layer upon which is formed a layer of hard magnetic material;

an "interrupt" layer;

a conductive lead layer, laminated so as to provide specular reflection of conduction electrons and formed over said "interrupt" layer.

16. The structure of claim 15 wherein the laminated hard magnetic underlayer comprises a seed double layer of Ta/Cr, the thickness of the Ta layer being preferably 50 Å, but which could be in the range between 30 Å and 75 Å, the thickness of the Cr layer being preferably 100 Å, but which could be between 50 Å and 150 Å, upon which Ta/Cr seed layer a layer of hard magnetic material such as CoPtCr or CoPt, is formed to a thickness between approximately 150 Å and 500 Å.

17. The structure of claim 15 wherein the "interrupt" layer is a layer of material formed with an amorphous structure.

18. The structure of claim 17 wherein the "interrupt" layer is designed to orient the crystal plane of a layer formed upon it in a direction parallel to the plane of that layer.

19. The structure of claim 18 wherein the "interrupt" layer is a layer of Ta, preferably formed to a thickness of 50 Å, but which could have a thickness of between 30 Å and 75 Å.

20. The structure of claim 15 wherein the conducting lead layer is a three layer lamination consisting of a first layer of NiCr, upon which is formed a layer of conducting

material, upon which is formed a second layer of NiCr, the interfaces between the NiCr and the conducting material causing specular reflection of conduction electrons so as to enhance the sheet conductivity of the formation.

21. The structure of claim 20 wherein the first layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 75 Å, the layer of conducting material is a layer of Rh, formed to a thickness of between 250 Å and 500 Å and the second layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 50 Å.

22. The structure of claim 20 wherein the first layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 75 Å, the layer of conducting material is a layer of Ru, formed to a thickness of between 250 Å and 520 Å and the second layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 50 Å.

23. The structure of claim 20 wherein the first layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 75 Å, the layer of conducting material is a layer of Ir, formed to a thickness of between 250 Å and 510 Å and the second layer of NiCr is preferably formed to a thickness of 50 Å, but which could be in a range between 30 Å and 50 Å.

24. A spin valve type magnetoresistive read element for reading high recorded density, high RPM magnetic disks, comprising a spin valve sensor element with abutted junctions upon which is formed a laminated longitudinal bias layer of hard magnetic material having high coercivity and squareness, and upon which is formed a laminated conducting lead layer of high sheet conductivity, high hardness, high melting point, high corrosion resistance and lacking the propensity for smearing, oozing, electromigration and nodule formation comprising:

a substrate;

a spin valve type sensor element;

a laminated hard magnetic underlayer comprising a Ta/Cr seed layer upon which is formed a layer of hard magnetic material having its close packed crystal plane perpendicular to its layer plane;

a conductive lead layer, whose close packed crystal plane is also perpendicular to its layer plane;

a capping layer.

25. The structure of claim 24 wherein the laminated hard magnetic underlayer comprises a seed double layer of Ta/Cr, the thickness of the Ta layer being preferably 50 Å, but which could be in the range between 30 Å and 75 Å, the thickness of the Cr layer being preferably 100 Å, but which could be between 50 Å and 150 Å, upon which Ta/Cr seed layer a layer of hard magnetic material such as CoPtCr or CoPt, is formed to a thickness between approximately 150 Å and 500 Å.

26. The structure of claim 24 wherein the layer of conductive material is a layer of Rh formed to a thickness of between 250 Å and 500 Å.

27. The structure of claim 24 wherein the layer of conductive material is a layer of Ir formed to a thickness of between 250 Å and 515 Å.

28. The structure of claim 24 wherein the capping layer is a layer of Cr, preferably formed to a thickness of 30 Å, but which could be between 30 Å and 50 Å.